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ABSTRACT

This study investigated the relative freshman-year cognitive impacts of 2 historically black and 16 predominantly white colleges on black students. Of these institutions, 5 were 2-year institutions and the rest were 4-year colleges. The data were taken from a pool of 2,416 freshmen students who participated in the National Study of Student Learning (NSSL), a large longitudinal investigation. Instruments included a precollege survey and the Collegiate Assessment of Academic Proficiency both administered in Fall 1992, as well as follow-up testing of the students in Spring 1993. Complete data were available for 405 black students. Of these, 243 attended a historically black institution and 162 attended a predominantly white institution. Analysis indicated no significant differences in the net cognitive effects attributable to college racial composition. Black students attending historically black institutions made net freshman year gains in reading comprehension, mathematics, critical thinking and composite achievement that were as large if not larger than their peers at mostly white institutions. In general, the statistically non-significant trends favored black students from historically black institutions. Results also suggested that the cognitive effects of college racial composition are not significantly influenced by a student's individual characteristics or the average freshman class academic aptitude. (Contains 48 references.) (JB)

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Do Black Students Learn More at Historically Black or Predominantly White Colleges?*

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Abstract

This study investigated the relative freshman-year cognitive impacts of two historically black and sixteen predominantly white colleges on black students. Controlling for individual precollege ability, gender, socioeconomic origins, academic motivation, age, credit hours taken, place of residence, and the average precollege ability of the students attending each institution, there was a general parity between black students attending historically black colleges and their counterparts at white institutions in standardized measures of reading comprehension, mathematics, critical thinking, and composite achievement.

Although the majority of black college students attend college at predominantly white institutions (Allen, Epps & Haniff, 1991; Peterson, et al., 1979), historically black colleges and universities still educate a significant number of black men and women. (Nettles, Thoeny & Gosman, 1986; Trent, 1984). A modest, but growing body of evidence examines the relative educational outcomes for black students associated with attending historically black versus predominantly white institutions. Generally, this research can be divided into four relatively distinct lines of inquiry. The first line of inquiry addresses the nature of the overall experience of college at historically black and predominantly white institutions. The weight of evidence suggests that black students attending predominantly white institutions experience significantly greater levels of social isolation, personal dissatisfaction, alienation, and overt racism than their counterparts at historically black colleges (e.g., Allen, 1986, 1987; Allen, Bobo, & Fleuranges, 1984; Allen, Epps & Haniff, 1991; Bean & Hull, 1984; Braddock, 1981; Davis, 1986; Guloyan, 1986; Livingston & Stewart, 1987; Loo & Rolison, 1986; see Pascarella & Terenzini, 1991 for a more complete review of these studies). Consistent with these findings, a second line of research suggests that attendance at a historically black institution is positively linked, both directly and indirectly, to persistence in college and bachelor's degree completion. Moreover, this positive link remains even after controlling for such salient confounding influences as academic aptitude, socioeconomic origins, secondary school achievement, educational aspirations, college grades, and the size, control, and academic selectivity of the institution attended (e.g., Anderson, 1985; Astin, 1975; Cross & Astin, 1981; Pascarella, Smart, Ethington, & Nettles, 1987; Pascarella, Smart, & Stoecker, 1989; Thomas, 1981; Thomas & Gordon, 1983).

A third line of inquiry has attempted to assess the socioeconomic benefits associated with attendance at historically black or predominantly white postsecondary institutions. Aside from a small, positive, indirect effect on occupational status for black women, and a possible positive

impact on becoming a physician, little evidence suggests suggest that attending a historically black college confers any substantial net economic or occupational advantage or disadvantage for black students (Astin, 1977; Pascarella, Smart, & Stoecker, 1989; Thomas & Gordon, 1983).

A fourth general line of inquiry has examined the cognitive or intellectual effects for black students associated with attendance at historically black versus predominantly white colleges and universities. The evidence is sparse and results inconclusive. In an analysis of ten predominantly white and five historically black colleges in North Carolina, Ayres (1982, 1983) found that black students attending the white institutions had higher scores on the National Teachers Examination (NTE) than their peers at historically black colleges--an effect that persisted even after controlling for precollege academic aptitude. This finding was only partially supported in a similarly designed study using the NTE by Davis (1977); and Fleming (1982, 1984) actually found that black students at a black college demonstrated larger freshman-senior differences than their counterparts at a white college in the ability to formulate concepts and think critically.

Other research on the relative cognitive impacts of historically black and predominantly white colleges uses the Graduate Record Examination (GRE) as the dependent measure. Controlling for student precollege aptitude, both Centra, Linn, and Parry (1970) and Astin (1968) found no significant differences in GRE area scores between students at white and students at black institutions. Unfortunately, their samples from predominantly white institutions include white as well as black students. Thus, it is difficult to determine if their findings reflect the specific impact of college racial composition on black students.

Although the existing research has contributed to our understanding of the cognitive and intellectual impacts of historically black colleges, it is not without its limitations. First, the accumulated evidence is somewhat dated, the most recent research being substantially more than a decade old. In that period of time, major demographic changes have occurred in the

population of the American postsecondary student body. Second, the predominant dependent measures employed (e.g., the National Teacher's Examination and the Graduate Record Examination) were not taken by samples of students representative of an institution's entire student body. Thus, the results of existing research may be seriously limited in terms of generalizability. Furthermore, tests such as the NTE and the GRE were developed primarily for professional licensing or graduate school admission decisions. They may not be the best instruments for assessing the cognitive skills or intellectual capabilities fostered by the undergraduate experience.

The existing research also has non-trivial methodological problems. Most studies estimate the effects of college racial composition while controlling for precollege academic aptitude. Although controls for student precollege academic aptitude are essential if one is to get a realistic estimate of the unique effect of college racial composition on cognitive development, factors such as academic motivation, age, socioeconomic background, residing on-campus, extent of enrollment, and gender may also directly or indirectly influence cognitive development during college (Pascarella & Terenzini, 1991; Pascarella, et. al., 1993). These potentially important confounding influences have been largely ignored in existing research. There are also design problems. The one investigation that attempts to estimate the general intellectual effects of attending historically black versus predominantly white colleges (Fleming, 1982, 1984) makes cross-sectional comparisons of different freshman and senior cohorts rather than following the same students over time. While such cross-sectional comparisons are useful, they do not provide the same level of control for confounding influences as longitudinal studies (Pascarella, 1987; Pascarella & Terenzini, 1991).

Finally, existing research has focused almost exclusively on estimating the general rather than conditional cognitive effects of attendance at historically black colleges. That is, it makes the implicit assumption that the cognitive effects of college racial composition tend to be the

same for all black students. Such an approach ignores the possibility that such effects may vary in magnitude for different kinds of students (e.g., students differing in gender, precollege aptitude, academic motivation, age, socioeconomic origins).

The present study sought to address some of the issues and problems in existing research by means of a longitudinal investigation of the effects of college racial composition on black students' freshman-year cognitive development. The study had two specific purposes. First, it attempted to assess the net effects of college racial composition using standardized measures of black students' freshman-year development in reading comprehension, mathematics, critical thinking, and composite achievement. In doing so,this study employed instruments specifically designed to assess cognitive skills acquired in the first two years of college. Second, it attempted to determine the extent to which the cognitive effects of college racial composition differ in magnitude for black students with different background and other characteristics (e.g., gender, precollege aptitude, precollege motivation, age, etc.).

METHOD

Institutional Sample

The sample was selected from incoming students new to 18 four-year and 5 two-year colleges and universities located in 16 states throughout the U.S. Institutions were selected from the National Center on Educational Statistics IPEDS data base to represent differences in colleges and universities nationwide on a variety of characteristics including institutional type and control (e.g., private and public research universities, private liberal arts colleges, public and private comprehensive universities, two-year colleges), size, location, commuter versus residential, and the ethnic distribution of the undergraduate student body. In aggregate, the first-year student populations of those 23 schools approximated the national first-year population of undergraduates by ethnicity and gender. Two of the 18 four-year institutions were historically

black colleges, one located in a mid-Atlantic and the other in a southern state. One historically black institution was public and the other was private. Since both historically black colleges were four-year institutions, the comparison group of predominantly white institutions was limited to the 16 remaining four-year institutions. Consequently, all analyses we report are based on student samples from the 18 four-year colleges and universities studied.

Student Sample and Instruments

The individuals in the overall sample were 2416 freshman-year students who participated in the National Study of Student Learning (NSSL), a large longitudinal investigation of the factors that influence learning and cognitive development in college. The research was sponsored by the federally-funded National Center on Postsecondary Teaching, Learning, and Assessment. The initial sample was, as far as possible, selected randomly from the incoming freshman class at each participating institution. Students in the sample were informed they would be participating in a national longitudinal study of student learning and that they would receive a stipend for their participation. They were also informed that the information they provided would be kept confidential and would never become part of their institutional records.

The initial data collection took place in the Fall of 1992 and lasted approximately three hours; students were paid a stipend of $25 for their participation. Students were reminded that the information they provided would be kept confidential and that all that was expected of them was that they give an honest effort on tests and a candid response to all questionnaire items. The instruments included a precollege survey that gathered information on student demographic characteristics and background, as well as aspirations, expectations of college, and their orientations toward learning. Participants also completed Form 88A of the Collegiate Assessment of Academic Proficiency (CAAP). The CAAP was developed by the American College Testing Program (ACT) specifically to assess selected general intellectual and cognitive

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skills typically acquired by students during the first two years of college (ACT, 1990). The total CAAP consists of five 40-minute, multiple-choice test modules, three of which--reading comprehension, mathematics, and critical thinking--were administered during the first data collection.

The CAAP reading comprehension test consists of 36 items that assess reading comprehension as a product of skill in inferring, reasoning, and generalizing. The test has four prose passages of about 900 words in length designed to measure the level and kinds of writing commonly encountered in college curricula. The passages were drawn from topics in fiction, the humanities, the social sciences, and the natural sciences. The KR-20, internal consistency reliabilities for the reading comprehension test range between .84 and .86. The mathematics test consists of 35 items designed to measure a student's ability to solve mathematical problems encountered in many postsecondary curricula. The emphasis is on quantitative reasoning rather than formula memorization. The content areas tested include pre-, elementary, intermediate, and advanced algebra; coordinate geometry; trigonometry; and introductory calculus. The KR-20 reliability coefficients for the mathematics test ranged between .79 and .81. The critical thinking test is a 32-item instrument measuring the ability to clarify, analyze, evaluate, and extend arguments. The test consists of four passages designed to be representative of the kinds of issues commonly encountered in a postsecondary curriculum. A passage typically presents a series of subarguments that support a more general conclusion. Each passage presents one or more arguments and uses a variety of formats, including case studies, debates, dialogues, overlapping positions, statistical arguments, experimental results, or editorials. Each passage is accompanied by a set of multiple choice items. The KR-20 reliability coefficients for the critical thinking test ranged from .81 to .82 (ACT, 1990). In pilot testing various instruments for use in the National Study of Student Learning on a sample of 30 college students, the critical thinking test of the CAAP was found to correlate .75 with the total score on the Watson-Glaser Critical Thinking

Appraisal.

Each of the 18 institutions was given a target sample size relative in magnitude to the respective sizes of the freshman class at each institution. The overall target sample for the Fall 1992 data collection at the 18 institutions was 3,910. The overall obtained sample size, (i.e., those students actually tested) was 3331, or a response rate of 85.19%.

A follow-up testing of the sample took place in the Spring of 1993. This data collection required about 3 1/2 hours and included an extensive set of measures of the students' freshman-year experience and Form 88B of the CAAP reading comprehension, mathematics, and critical thinking modules. Students were paid a second stipend of $35 by the National Center on Postsecondary Teaching, Learning, and Assessment for their participation in the follow-up data collection. Of the original sample of 3331 students who participated in the Fall, 1992 testing, 2416 participated in the Spring, 1993 data collection, for a follow-up response rate of 72.53%.

Given the high response rates at both testings, it is not particularly surprising that the sample was reasonably representative of the population from which it was drawn. However, to adjust for potential response bias by gender, ethnicity, and institution a sample weighting algorithm was developed. Specifically, within each of the individual institutions participants in the follow-up data collection were weighted up to the institution's freshman population by gender (male or female) and ethnicity (white, black, Hispanic, other). Thus, for example, if institution A had 100 black men in its freshman class and 25 black men in the sample, each black male in the sample was given a sample weight of 4.00. A similar weight was computed for participants falling within each gender x ethnicity cell within each institution. The effect of applying sample weights in this manner was to adjust not only for response bias by gender and ethnicity, but also for response bias by institution.

Of the 2416 students participating in the follow-up testing, complete data for the different analyses conducted in the study were available for 405 black freshman students. Of

these 405 black students, 243 attended one of the two historically black institutions while 162 attended the 16 predominantly white institutions. Based on the weighted sample these 405 black students represented a population of 3523 black students, 1772 in the freshman classes at the two historically black colleges and 1751 in the freshman classes at 16 predominantly white institutions.

Design and Data Analysis

The study design was a pretest-posttest quasi-experimental design, in which comparison groups were statistically equated on salient precollege (Fall, 1992) and other variables. The comparison groups were black students attending historically black colleges and black students attending predominantly white institutions. The dependent variables were Spring, 1993 scores on the CAAP reading comprehension, mathematics, and critical thinking tests, plus a measure of freshman year composite achievement that combined all three tests. The composite achievement measure was constructed in two steps. First, each of the three CAAP tests (i.e., reading, math, and critical thinking) was standardized to put each on the same metric. Subsequently the composite achievement score was computed by summing across standardized scores and assigning an arbitrary scale mean of 100 and standard deviation of 10 for the entire follow-up sample (N = 2416). The alpha, internal consistency reliability for the composite achievement measure was .83.

In order to control statistically for precollege and other salient differences between black students attending historically black and those at predominantly white institutions, least-squares analysis of covariance was the basic analytic approach. Individuals were the unit of analysis. Guided by the existing body of evidence on the factors independently influencing learning and cognitive development during college (e.g., Astin, 1968, 1977, 1993; Astin & Panos, 1969; Kuh, 1993; Pascarella & Terenzini, 1991), the individual level covariates in the study included:

1. Individual Fall, 1992 (precollege) CAAP reading comprehension, mathematics, critical thinking, and composite achievement scores [each employed in analysis of the appropriate end-of-freshman year (Spring, 1993) CAAP reading comprehension, mathematics, critical thinking, and composite achievement score].

2. Gender

3. Family social origin: the combination of standardized measures of mother's and father's level of formal education and combined family income.

4. Fall, 1992 (precollege) academic motivation: an eight-item, Likert-type scale (4 = strongly agree to 1 = strongly disagree) with an internal consistency reliability of .65. The scale items were developed specifically for the NSSI and were based on existing research on academic motivation (e.g., Ball, 1977). Examples of constituent items are: "I am willing to work hard in a course to learn the material, even if it won't lead to a higher grade," "When I do well on a test it is usually because I was well prepared, not because the test was easy," "In high school I frequently did more reading in a class than was required simply because it interested me," and "In high school I frequently talked to my teachers outside of class about ideas presented during class."

5. Age: age in years as of Fall, 1992.

6. Credit hours taken: total number of credit hours for which the student was enrolled during the freshman year.

7. On- or off-campus residence: a dichotomous variable indicating whether the student resided on-campus or lived off-campus and commuted to college during the freshman year.

Because the existing body of evidence suggests that institutional context can often shape the impact of college in indirect, if not direct, ways, we also included one institutional-level variable as a covariate in the analytic model. This was:

8. The average level of academic aptitude of the freshman class: estimated by the

average Fall, 1992 CAAP reading, mathematics, critical thinking, or composite achievement score for the freshman class at each of the 18 institutions. Each student in the sample was given the mean of his or her institution on all three CAAP tests plus the composite, and each of the institutional mean scores was employed in analysis of the appropriate end-of-freshman year (Spring, 1993) individual-level reading comprehension, mathematics, critical thinking, or composite achievement score. Our logic for includng this variable as a covariate was that it was important to control for differences among institutions in the average academic selectivity of their student bodies.

The analysis of covariance for each of the four dependent measures employed a least-squares regression solution and was conducted in a hierarchical manner. The influence of attending a historically black versus a predominantly white institution was estimated while controlling for the effects of all eight covariates. The results of this analysis provided estimates of the effects of college racial composition on end-of-freshman year reading comprehension, mathematics, critical thinking, and composite achievement, net of the influence of the covariates. Since precollege (Fall, 1992) reading, mathematics, critical thinking, and their composite were included among the covariates, a significant effect attributable to college racial composition indicates that there are significant net differences between black students attending historically black and predominantly white institutions, not only in end-of-freshman year reading comprehension, mathematics, critical thinking, and composite achievement but also in the gains made on those cognitive dimensions during the freshman year (Linn, 1986; Linn & Slinde, 1977; Pascarella & Terenzini, 1991).

In the second stage of the analyses we tested for the presence of covariate x college racial composition conditional effects, one of the assumptions of the analysis of covariance model (Elashoff, 1969; Kerlinger & Pedhazur, 1973). A series of cross-product terms was computed between college racial composition and each of the eight covariates. These were then

added to the regression model containing the covariates and a dummy variable representing attendance at a historically black versus a predominantly white institution (i.e., the main-effects model). A statistically significant increase in the explained variance (R^2) attributable to the set of cross-product terms (over and above the main-effects model) indicates that the net effects of college racial composition vary in magnitude for individuals at different levels of the respective covariates.

The weighted sample of black students (N= 3523), adjusted to the actual sample size (N = 405) to obtain correct standard errors, was used in all analyses. Although a set of supplementary unweighted analyses yield results essentially the same as those with the weighted sample, we report weighted sample estimates in the remainder of the paper.

RESULTS

Table 1 shows the analysis of covariance summaries and Table 2 reports the weighted covariate-adjusted means and standard deviations on all four cognitive outcomes for black students at historically black and predominantly white institutions. As shown in Table 1, when the influence of all eight covariates was controlled there were no statistically significant differences between black student groups on any of the four end-of-freshman year cognitive outcomes. As previously indicated in the methods section, this is essentially the same as saying there were no significant group differences in the freshman-year gains made in reading comprehension, mathematics, critical thinking, or composite achievement. Only one analysis approached statistical significance. On mathematics the null hypothesis for the group effect could be rejected at $p < .10$.

Place Tables 1 & 2 About Here

As shown by the covariate-adjusted means in Table 2, there was a non-significant trend for black students attending historically black colleges to have higher end-of-freshman year scores in reading comprehension, mathematics, and composite achievement than their black counterparts attending predominantly white institutions. On end-of-freshman year critical thinking there was virtually no difference between the two groups.

The second phase of the analyses sought to determine if the cognitive effects of college racial composition differed in magnitude for black students with different precollege or other characteristics. It also examined whether the cognitive impacts of college racial composition differed depending on the average academic preparation of the student body. In none of the four analyses conducted was the set of eight covariate x college racial composition cross-products associated with a significant increase in explained variance (R^2) over and above the main-effects model (i.e., the eight covariates plus college racial composition). This finding suggests that the cognitive effects of college racial composition are general rather than conditional. That is, the small non-significant group trends shown in Table 2 tend to apply irrespective of a student's particular position or score on any of the eight covariates (i.e., gender, family social origins, academic motivation, age, credit hours taken, on- or off-campus residence, individual level of Fall 1992 reading, math, critical thinking, or composite achievement; and average level of Fall 1992 reading, math, critical thinking, or composite achievement for each institution).

DISCUSSION

A longstanding critique of historically black colleges holds that these institutions may not provide an educational experience equal to that of many predominantly white institutions because of relative disadvantages in important educational resources such as libraries, laboratories, computer facilities, distinguished faculties, available financial support and academically well-prepared students (e.g., Bowles & DeCosta, 1971; Jencks & Reisman, 1968; Sowell, 1972).

Indeed, evidence from national samples indicates that historically black colleges (as compared to their predominantly white counterparts) have lower educational expenditures per student, and enroll students from lower socioeconomic backgrounds who are also less prepared academically for college (e.g., Pascarella, Smart, & Stoecker, 1989). Implicit in this critique is the assumption that an institution's stock of financial, educational, and human resources is a valid index of its ability to provide an influential educational experience. A recent review of evidence on the impact of college, however, suggests that resources alone do not guarantee institutional impact (Pascarella & Terenzini, 1991). Rather, institutional impact may be more a function of what colleges do programmatically with the resources they have to foster effectiveness in such areas as general education, the quality of teaching, student services and student life, student faculty interaction, student involvement in the academic and social systems of the institution, and sense of campus community (Astin, 1984, 1993; Chickering & Reiser, 1993;Pascarella & Terenzini, 1991).

Even if they are at a relative disadvantage in terms of educational resources, an impressive body of evidence suggests that historically black colleges have nevertheless been able to create a social-psychological campus climate that not only fosters students' satisfaction, sense of community, and adjustment to college, but which also increases the likelihood of persistence and degree completion. The findings of this study suggest further that the supportive campus environments of historically Black colleges do not come at the cost of intellectual or academic rigor. Using a more extensive set of individual and institutional-level controls than any existing research, and employing measures specifically designed to capture intellectual skills gained in the early college career, we uncovered no significant differences in the net cognitive effects attributable to college racial composition.[1] Black students attending historically black institutions made net freshman year gains in the areas of reading comprehension, mathematics, critical thinking, and composite achievement (i.e., the sum of all three scales) that were as large if not

larger than those made by their black peers attending predominantly white institutions. Indeed on all scales except critical thinking, where there was an essential parity, the statistically non-significant trends favored black students from historically black institutions. The findings also suggest that cognitive effects of college racial composition are general rather than conditional. That is, they are not significantly influenced by a student's individual characteristics (e.g., gender, precollege aptitude, precollege academic motivation, age, socioeconomic origins) or the average freshman class academic aptitude of the institution attended.

Clearly, there has been a strong national press to increase student ethnic diversity within individual American colleges and universities; and there is at least some evidence of the positive educational impacts of such within-college diversity (Astin, 1993). Yet, when viewed within the context of the total body of evidence on the educational impacts of college racial composition, the findings of the present study underscore the potential importance of also maintaining some place for homogeneous institutions in the American postsecondary system. Because they tend to be racially homogeneous, black colleges obviously run counter to the national trend for greater student ethnic and racial diversity within colleges and universities. Moreover, it can be argued that the racial homogeneity of historically black colleges tends to reinforce racial separation rather than increasing the likelihood of interaction and understanding among different racial groups. At the same time, these issues may need to be weighed against the growing body of evidence that historically black colleges are more effective than predominantly white institutions in providing a supportive social-psychological environment for black students that enhances persistence and degree completion while maintaining an academic climate that is at least equivalent in intellectual rigor and impact.

LIMITATIONS

This investigation has several limitations that should be kept in mind when interpreting

the findings. First, although the overall sample is multiinstitutional and consists of a broad range of institutional types from around the country, the fact that only two black colleges were studied means that we cannot necessarily generalize the results to all historically black institutions. Similarly, although attempts were made in the initial sampling design and subsequent sample weighting to make the sample as representative as possible at each institution, the time commitment required of each student participant undoubtedly led to some self-selection. We cannot be sure that those who were willing to participate in the study responded in the same way as those who were invited but declined to participate in the study. Third, while we looked at several different measures of cognitive development in college (reading comprehension, mathematics an critical thinking), these are certainly not the only dimensions along which students develop intellectually during the college years. Alternative conceptualizations or approaches to the assessment of cognitive development might have produced findings different from those yielded by this investigation. Finally, this study is limited by the fact that it was only able to trace the cognitive growth of black students over the first year of college. We cannot be sure that the apparent parity in freshman-year cognitive growth demonstrated by black students at historically black and predominantly white colleges would persist over time.

FOOTNOTES

1. It is sometimes risky to interpret non-significant differences substantively because they can be caused by statistical and measurement artifacts. However, those particular artifactual conditions are unlikely to hold in the present study. First, the unweighted sample size of 405 is sufficiently large to detect rather small between-group effects (Cohen & Cohen, 1975). Second, each of the four dependent measures had more than adequate reliability (.80 or higher) to detect between-group differences (Thorndike & Hagen, 1977). Third, the use of strong covariates, including a parallel precollege measure of each dependent variable, substantially lowered the error term and dramatically increased the probability of finding any real between-group differences that existed (Pedhazur, 1982). Finally, the dependent measures employed in the study each tap cognitive dimensions shown to be significantly influenced by exposure to postsecondary education (Pascarella & Terenzini, 1991).

TABLE 1

ANALYSIS OF COVARIANCE SUMMARIES FOR END-OF-FRESHMAN YEAR READING COMPREHENSION, MATHEMATICS, CRITICAL THINKING, AND COMPOSITE ACHIEVEMENT

	Reading Comprehension		Mathematics		Critical Thinking		Composite Achievement	
SOURCE	df	F	df	F	df	F	df	F
Covariates*	8	33.52*	8	56.73*	8	44.86*	8	77.22*
Attended A Historically Black Versus a Predominantly White College	1	1.16	1	2.69	1	0.02	1	0.55
Residual	395		395		395		395	
Total	404		404		404		404	

*Individual Fall, 1992 reading, math, critical thinking, or composite achievement score; Average Fall, 1992 reading, math, critical thinking, or composite achievement score for each institution; Gender; Family social origins; Fall, 1992 academic motivation; Age; Freshman year credit hours taken; On- or off-campus residence.

*$p < .01$

TABLE 2

COVARIATE-ADJUSTED MEANS AND STANDARD DEVIATIONS FOR END-OF-FRESHMAN YEAR READING COMPREHENSION, MATHEMATICS, CRITICAL THINKING, AND COMPOSITE ACHIEVEMENT

GROUP	Reading Comprehension	Mathematics	Critical Thinking	Composite Achievement*
ATTENDED A HISTORICALLY BLACK COLLEGE				
MEAN	60.15	57.28	59.99	95.93
SD	4.77	3.49	5.10	8.60
ATTENDED A PREDOMINANTLY WHITE COLLEGE				
MEAN	59.63	56.78	60.06	95.53
SD	5.10	3.56	5.36	8.40

*Z-scores (mean = 0, standard deviation = 1) were used to form Composite Achievement from the sum of Reading Comprehension, Mathematics, and Critical Thinking. These were then transformed to standard scores with a mean = 100 and a standard deviation = 10 for the entire sample (N = 2416).

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